APPLICATION UNDER UNITED STATES PATENT LAWS

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Invention: WAKEBOARD PULLING APPARATUS

Inventor (s): Yves BERTHIAUME
John T. HUBERTY

For correspondence Address
00909
Pillsbury Winthrop LLP

This is a:

- ☐ Provisional Application
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- ☐ Continuing Application
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SPECIFICATION

WAKEBOARD PULLING APPARATUS

Cross-Reference to Related Applications

[0001] This application claims priority to U.S. Provisional Application No. 60/401,014 filed August 6, 2002. The entirety of that application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] This invention relates to jet powered watercraft, especially personal watercraft ("PWC"). In particular, the invention is directed to a towing apparatus for a PWC.

Description of Related Art

[0003] Conventional pulling apparatus on watercraft consists of tow eye hooks extending from the deck or hull or pylons that extend upwardly from the deck. Typical pylons are rigid poles, some of which extend by telescoping. Pylons are often supported by guy lines or poles from the deck so that the upstanding pylon does not pull out of its mooring during use. Pylons can be single poles or can be formed as towers or roll cages.

[0004] **FIGS. 7** and **8** illustrate examples of these prior art pulling apparatuses. Each figure shows the rear of a watercraft **310** having a hull **312** and a deck **314**. A steering nozzle **316** extends from the jet propulsion system as is conventionally known through the rear of the hull **312**. A pedestal **318** extends from the deck **314** and supports a seat **320** and a grab handle **322**. Behind the seat **320** and pedestal **318** is a reboarding platform **324** formed in the deck **314**, which provides a space onto which a person in the water may climb onto the watercraft **310**. As shown in **FIG. 7**, one apparatus for attaching a tow line to a watercraft **310** is a tow eye hook **326**. And as shown in **FIG. 8**, another apparatus is a telescoping pylon **328**, having a spool **330** at the top and a joint **332** for collapsing the telescoping pylon **328** near the middle of the pylon.

[0005] When pulling or towing an object with a watercraft, the watercraft can experience a force from the object that causes the watercraft to move. There are three different types of movements typically experienced by a watercraft: yaw, roll, and pitch. Yaw describes movement about a vertical axis. Roll means to move from side to side about a longitudinal axis. Pitch describes movement about a lateral axis, as in the bow slanting up or down. For example, a sport boat pulling a water skier can be pulled from side to side when the skier traverses the

wake. This lateral movement of the stern of the watercraft, or yaw, can affect the ride of the watercraft.

[0006] When a pylon is used to pull an object, the force exerted by the object also affects the watercraft along its longitudinal axis as the force is applied above the hull of the watercraft. So, if a wake boarder, for example, makes a hard side cut, the watercraft can experience a lateral force applied at the top of the pylon where the tow rope is secured. This can cause the watercraft to roll to one side, again affecting the ride.

[0007] An object being pulled by a watercraft can also create a downward movement of the stern relative to the bow of the watercraft. This movement, or pitch, can be amplified by the application of the pulling force at the top of the pylon.

[0008] The effect of a towed object is more pronounced in lighter watercraft, such as personal watercraft (PWC). In that case, a wake boarder, for example, can exert a large pulling force on a PWC, especially if the wake boarder is engaging in tricks and acrobatic moves, as is currently popular. As understood by those of ordinary skill in watercraft design, towed objects that are moving different directions, especially at high speeds, can have a significant impact on the yaw, roll, and pitch of a vehicle.

[0009] Another issue associated with towed objects is the structure used to support the tow rope. In an effort to lift the rope above the surface of the water, upright pylons are commonly used. To adjust the height of the tow rope above the water, telescoping pylons are used. Telescoping pylons are convenient because they retract when not in use. However, the telescoping feature can be problematic due to interference between the telescoping elements, which can cause jamming and affect operation. Also, rust and salt corrosion are common problems in marine environments that can affect the performance of moving parts.

BRIEF SUMMARY OF THE INVENTION

[0010] An aspect of embodiments of this invention is to provide a towing apparatus for a watercraft that minimizes the effects of pulling an object behind the watercraft.

[0011] Another aspect of embodiments of this invention reduces the effect on roll, pitch and yaw of a watercraft from a towed object.

[0012] A further aspect of embodiments of this invention provides a pylon that can be easily and securely stowed when not in use.

[0013] The invention is directed to a watercraft comprising a hull having a longitudinal center line and a deck supported by the hull, a propulsion source supported by the hull, and a towing apparatus secured to one of the deck and the hull. The towing apparatus has a towing point from which a tow line extends, and the towing point is movable with respect to the longitudinal center line.

[0014] The towing apparatus can comprise a towing bar having two ends and an apex, with each end secured to one of the deck and the hull on opposed sides of the longitudinal center line and the apex being positioned rearwardly of the two ends with respect to hull and generally aligned with the longitudinal center line.

[0015] The towing bar can also comprise a flexible towing bar that is formed as an upright member extending upwardly from the deck. Preferably, the upright member is generally wedge shaped having a wider and less flexible portion adjacent the deck.

[0016] The invention is also directed to a watercraft comprising a hull and a deck supported by the hull, a propulsion source supported by the hull, a pylon support assembly positioned on the deck including a variable pylon attachment point, and a towing pylon removably secured to the variable attachment point in a first stowed position and in a second operative position.

[0017] Preferably, the towing assemblies that embody the invention are provided on a personal watercraft or a watercraft that has a jet propulsion unit.

[0018] These and other aspects of the invention will become apparent upon reading the following disclosure in accordance with the Figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] **FIG. 1** is a side schematic view of one type of watercraft with a towing assembly in accordance with a preferred embodiment of the invention;

[0020] **FIG. 2** is a partial perspective view of the rear of the watercraft of **FIG. 1**;

[0021] **FIGS. 3A** through **3C** are schematic views of the rear of the watercraft of **FIG. 1** that demonstrate the points of force application when the object being towed is in various positions relative to the watercraft;

[0022] **FIG. 4** illustrates a partial perspective rear view of one type of watercraft with a towing assembly in accordance with a second preferred embodiment of the invention;

[0023] **FIGS. 4A** through **4B** are schematic views of the rear of the watercraft of **FIG. 4** that demonstrate the manner of operation of the apparatus of **FIG. 4** when the object being towed is displaced laterally relative to the watercraft;

[0024] **FIG. 5A** is a partial cross-section of the deck and reboarding platform of one type of watercraft with a towing assembly in accordance with a third preferred embodiment of the invention in the stowed position;

[0025] **FIG. 5B** is a partial cross-section of the deck and reboarding platform of one type of watercraft with a towing assembly in accordance with a third preferred embodiment of the invention in the operative position;

[0026] **FIG. 6A** is an enlarged partial cross-sectional view of the apparatus in **FIG. 5A** showing the pylon resting in the support channel in the stowed position;

[0027] **FIG. 6B** is an enlarged partial cross-sectional view of the apparatus in **FIG. 5B** showing the pylon resting in the support channel in the operative position;

[0028] **FIG. 7** is a partial side view of a watercraft using a prior art towing apparatus with an eye hook; and

[0029] **FIG. 8** is a partial side view of a watercraft using a prior art towing apparatus with a telescoping pylon.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0030] The invention is described with reference to a personal watercraft ("PWC") for purposes of illustration only. However, it is to be understood that the towing systems described herein can be utilized in any watercraft, particularly those crafts that are powered by a jet propulsion system, such as sport boats.

[0031] Further, the present embodiment describes an apparatus generally used for towing a skier behind the PWC, but one skilled in the art will recognize that the PWC could tow any object using this apparatus. The towed object could be a wakeboard and rider, an inflatable object, another boat, or a person. The towed object also could be an airborne object such as a parasail.

[0032] The general construction of a PWC **10** in accordance with a preferred embodiment of this invention is shown in **FIG. 1**. The following description relates to one way of manufacturing a PWC according to a preferred design. Obviously, those of ordinary skill in

the watercraft are will recognize that there are other known ways of manufacturing and designing watercraft and that this invention would encompass other known ways and designs.

[0033] The watercraft **10** of **FIG. 1** is made of two main parts, a hull **12** and a deck **14** integrally joined together. The hull **12** buoyantly supports the watercraft **10** in the water. The deck **14** is designed to accommodate a rider and, in some watercraft, one or more passengers.

[0034] The space between the hull **12** and the deck **14** forms a volume commonly referred to as the engine compartment **16** (shown in phantom). The engine compartment **16** accommodates an engine **18** as well as a muffler, tuning pipe, gas tank, electrical system (battery, electronic control unit, etc.), air box, storage bins, and other elements required or desirable in the watercraft **10**. The engine **18** is preferably an internal combustion engine, but an electric motor or other power generation source may be used.

[0035] The deck **14** has a centrally positioned straddle-type seat **20** positioned on top of a pedestal **22** to accommodate a rider in a straddling position. The seat **20** may be sized to accommodate a single rider or multiple riders. A grab handle **24** may provided between the pedestal **22** and the rear of the seat **20** to provide a handle onto which a passenger may hold. This arrangement is particularly convenient for a passenger seated facing backwards for spotting a water skier, for example. A pair of walls generally extending upward from the deck **14** and commonly known as gunwales or gunnels **26** provide lateral support for the rider's feet.

[0036] Steering handles **28** are located on a helm assembly **30** that is located forward of the seat **20**. The helm assembly **30** also contains other devices that allow the rider to operate the watercraft **10**. Forward of the helm assembly **30** is a hood **32** that may provide access to a storage compartment. Rearview mirrors **34** are positioned on either side of the hood **32** to allow the rider to see behind.

[0037] The watercraft **10** is generally propelled by a jet propulsion system **36** or jet pump, which pressurizes water to create thrust as is known. The propulsion system **36** can be supported in the hull **12** or can be an outboard engine.

[0038] A reboarding platform **38** is provided at the rear of the watercraft **10** on the deck **14** to allow the rider or a passenger to easily reboard the watercraft **10** from the water. Carpeting or some other suitable covering may cover the reboarding platform **38**. A retractable ladder (not shown) may be affixed to the rear of the deck **14** to facilitate boarding the watercraft **10** from the water onto the reboarding platform **38**.

[0039] As best seen in **FIGS. 1** and **2**, in one embodiment of the invention, the watercraft **10** further comprises a towing apparatus in the form of a towing bar **40** having two ends **42** and an apex **44**. The towing bar **40** is supported on either side by braces **46** that connect to the towing bar **40** and one of the hull **12** or the deck **14**. The towing bar **40** can be formed of a bent rigid pipe. The towing bar **40** is preferably fixed to the deck **14** or to the watercraft frame or internal support structure to provide a secure mount. It is also possible to provide a mounting structure on the deck **14** or hull **12** that allows the towing bar **40** to be removably secured to the mounting structure.

[0040] A tow line **48** is connected to the towing bar **40** by a slidable connector **50**. The slidable connector **50** allows the tow line **48** to move along the length of the towing bar **40**, both laterally with respect to a longitudinal axis **52** of the watercraft **10** and vertically with respect to a horizontal reference line, such as the waterline. The slidable connector **50** is preferably a sleeve **56** with a tow rope fastener **58** such as a clamp. The fastener **58** can be formed integral with the tow rope **48**. Alternatively, the sleeve **56** can be a hook or other type of grommet secured to the end of a tow line **48**. It is also possible to simply tie or loop the tow line **48** to the towing bar **40**.

[0041] The towing point **54** is the point at which the slidable connector **50** is positioned along the towing bar **40** while the tow line **48** is in use. As best seen in **FIGS. 3A** through **3C**, the towing point **54** moves along the arc of the towing bar **40** as the object being towed moves laterally with respect to the longitudinal axis **52** of the watercraft **10**. As a result of the shape of the towing bar **40** in the present embodiment, the towing point **54** moves both vertically and horizontally, thereby reducing the effect of roll on the watercraft **10**.

[0042] In the present embodiment, the towing bar **40** is generally V-shaped with a rounded apex **44**, but one skilled in the art will recognize that a bar of any shape may be used, as long as the towing point **54** is movable with respect to a longitudinal axis **52** of the watercraft. The apex **44** represents the highest point with respect to the deck **14** and the most rearward point. For example, the towing bar **40** could be generally U-shaped. Although the present embodiment contemplates both horizontal and vertical change of position of the towing point **54** as it travels along the towing bar **40**, vertical change of position is not essential to the invention. Therefore, the towing bar **40** could be substantially linear and disposed horizontally and perpendicular to the longitudinal axis **52** of the watercraft **10**. The towing bar also could be generally U-shaped or generally V-shaped but positioned on the watercraft **10** such that the apex **44** is the most

rearward point but is the same height as the rest of the towing bar **40**. Then, as the slidable connector **50** moves along the towing bar **40**, the towing point **54** would not change vertical position. It is also contemplated that the towing bar **40** could formed of a pliable or resilient material so that a pulling force will temporarily distort the towing bar **40** to diminish the effect of the force.

[0043] As seen in **FIG. 4**, in accordance with another embodiment of the invention, a flexible towing bar **100** is provided on the reboarding platform **38** with a plurality of apertures **102** through which the tow line **48** is looped. The towing bar **100** is supported by and mounted or joined to the deck **14** at the reboarding platform **38**. The towing bar **100** can be bolted or otherwise securely fastened onto the deck **14** or mounted in a receptacle formed in the deck **14**. Preferably, the towing bar **100** is formed as an upright beam positioned at the longitudinal axis **52** of the watercraft. The towing bar **100** is formed of a flexible material, such as plastics, fiberglass, or composites.

[0044] The towing bar **100** may take the form of a trapezoid, as shown, or of any other shape capable of accommodating at least one aperture **102** or tow rope connecting mechanism. The towing bar **100** is preferably constructed such that its cross sectional area where it contacts the reboarding platform **38** is greater than that at its top, or unsecured, end. This change of cross sectional area causes the lower portion of the towing bar **100** to be less flexible than the upper portion.. The change of cross sectional area can occur gradually throughout the height of the of the towing bar **100**, or it can occur abruptly at one or several distances from the reboarding platform **38**.

[0045] While this embodiment discloses a towing bar **100** with four apertures **102** through which the tow line **48** is attached, one skilled in the art will recognize that any number of apertures **102** can be provided. Further, apertures are not the only possible means of connecting the tow line **48** to the towing bar **100**. The present invention could comprise a flexible towing bar without apertures, but with at least one fastening mechanism, such as a hook or a groove.

[0046] As shown in **FIG. 4A**, the tow line **48** can be looped through an aperture **102** near the middle of the towing bar **100**. When the object being towed moves laterally with respect to the longitudinal axis **52**, the tow line **48** causes the flexible towing bar **100** to bend or flex in the lateral direction of the object being towed. And as shown in **FIG. 4B**, the tow line **48**

can be looped through an aperture **102** near the top of the towing bar **100** to offer more flexibility.

[0047] Another towing assembly in accordance with this invention provides a mounting arrangement for a pylon that allows the pylon to be stowed when not in use for towing. In this case a towing pole or rigid pylon **200** is provided with two mounting positions thus forming a variable attachment point. Referring to **FIGS. 5A** and **5B**, a first mount **202** and a second mount **204** are provided on the deck **14** behind the pedestal **206**. The mounts **202** and **204** are preferably spaced from each other along the longitudinal axis **208** and are displaced vertically with respect to a horizontal reference line. Preferably the mounts **202** and **204** are formed as balls **210, 211**. However, the mounts **202** and **204** can take any form, including but not limited to posts and sockets.

[0048] The pylon **200** is supported at its bottom **212** by one of the mounts **202** and **204**. The bottom **212** of the pylon **200** has a receiving formation, which is preferably a socket **214** for selectively receiving the balls **210, 211**. However, the bottom **212** can take any form that will allow the mounts **202** and **204** to support the pylon **200** substantially without vertical or horizontal movement. A locking mechanism, such as a pin or snap fit, could also be added if desired to form a locked secure mounting connection.

[0049] The pylon **200** is supported along its shaft **216** by a lateral support member **218**. The lateral support member **218** is preferably formed by the grab handle **24** such that the pylon **200** extends through an opening in the grab handle **24** in both the stowed position and the operative position. The lateral support member **218** provides two support channels **220, 222**, which are preferably formed by two guide members **224, 226**. Guide member **224** has a substantially vertical surface **228** and an angled surface **230**, which extends forward at an acute angle to a vertical reference line. Guide member **226** has a substantially vertical surface **232** and an angled surface **234** that extends rearwardly at an acute angle to a vertical reference line.

[0050] The lateral support member **218** and variable attachment points provide two positions in which the pylon **200** may be placed: a stowed position and an operative position. When the pylon **200** is in the stowed position, the bottom **212** is supported by the first mount **202**, and the shaft **216** is supported by the support channel **220** formed by the angled surfaces **230** and **234** of the guide members **224, 226**. This position is illustrated in Figs. 5A and 6A. When the pylon **200** is in the operative position, the bottom **212** is supported by the second mount **204**, and the shaft **216** is supported by the support channel **224** formed by vertical inner

surfaces **228, 232** of the guide members **224, 226**. This position is illustrated in Figs. 5B and 6B. Thus, it can be appreciated that the pylon **200** is securely stored in both positions and is conveniently inobtrusive in the stored position. It is also possible to use this arrangement with different types of pylons, including telescoping pylons, and other types of towing poles. By forming the lateral support **218** in the grab handle **24** extra parts are not necessary, which reduces costs and enhances the appearance of the vehicle.

[0051] Although the above description contains specific examples of the present invention, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. Thus, the scope of the invention should be determined by the appended claims and their legal equivalents rather than by the examples given.